LETTERS TO THE EDITOR.

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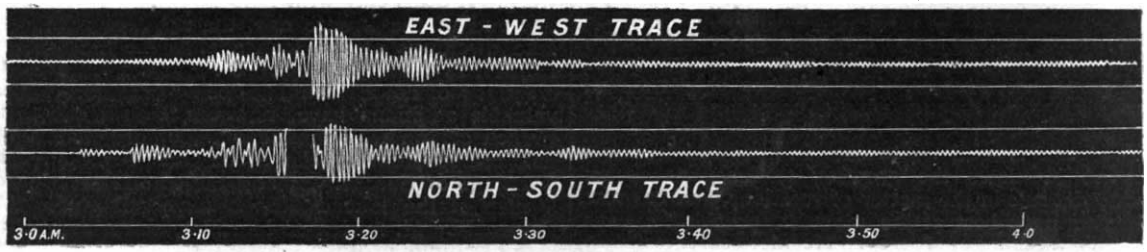
Seismograms of the Earthquake of January 23.

WITH reference to the article on "Recent Earthquakes" in NATURE of January 28, the accompanying records of the earthquake of January 23 may perhaps be of interest. These are from negatives printed from the original curves taken with the Milne twin-boom seismograph at the new magnetic observatory at Eskdalemuir, Dumfries-shire, of which Mr. G. W. Walker is superintendent.

The interval between the breaks in the curve (not shown in the accompanying reproduction) is one hour, and the hour mark near the commencement of the earthquake



corresponds, as nearly as could be ascertained, to 3h. 5m. a.m., G.M.T., January 23. The natural period of both booms is 18·6s., and the sensitivity is such that 1 mm. = 0″·44.

The east-west is clearer than the north-south trace, and a short piece of the latter is omitted, as it is not possible to reproduce it with certainty from the negative.

R. T. GLAZEBROOK.

The National Physical Laboratory, Teddington, Middlesex, February 1.

The Italian Earthquake.

THE able article in NATURE of January 7 (p. 277) by "R. D. O.," and the useful notes appended thereto, have no doubt been read with interest by students of physical geology all the world over. I should like to add a few remarks, which may perhaps be also found useful.

Thanks to the masterly teaching of the veteran geologist Prof. Suess, of Vienna, as first outlined in his smaller work, "Die Entstehung der Alpen," and to the teaching of the Swiss school, we have learned in the last two decades to trace a clearer causal connection between disturbances of this sort and the local architectonic structure of the lithosphere. The essential factor of such phenomena would seem to be the local weakness of the crust, resulting in its yielding, in this area or in that, to variations of stress in those potentially molten portions of the lithosphere, which, while practically rigid under the rapid rotatory motion of the earth (see my letter to NATURE, May 4, 1905, on "The Rigidity of the Earth's Interior"), exist under planetary pressure at temperatures above the solid-liquid critical temperature of the mineral masses of which they are composed.

The variations referred to (whether from cosmic or terrestrial causes) compel portions of the overlying crust, of course, to adjust themselves under the influence of gravitation to the altered mechanical conditions. Such adjustments may, and generally do, occur on lines of ancient "faulting," and may be classified as positive and negative. The former we should expect to occur as downward movements under the direct action of gravitation where faulting occurs in a synclinal flexure, the tendency of the bed-rock being to sag down, and in such cases we get a slip-fault movement. On the other hand, where any part of the force of gravity is resolved into tangential thrusts on or near axes of anticlinal flexures, the fault-movements are almost bound to be of an overthrust nature. Of these two types we may regard the San Francisco earthquake of 1906 as an instance of a slip-fault movement. The later Valparaiso earthquake, on the other hand, would appear to have been due to movement on planes of overthrust faulting in an anticline, and this alone would account for the greater and more widespread devastation witnessed in that case.

Applying this reasoning to the earthquake of December 28 last, we should expect to find that the movement was of the Valparaiso type, and this receives confirmation from the external fissuring of the ground at the surface. A reference to Prestwich's geological map of Europe throws light at once upon the problem. The Messina Strait is seen to be on the axis of an anticlinal flexure, the sea being there less than 100 fathoms deep. The 100-fathom contour is seen to approach the strait at both ends, and then to double rather sharply back, especially on the Ionian side, while the 1000-fathom contour runs in approximate parallelism to it, and much nearer to it on the Ionian side than on the Tyrrhenian side. The faulting, which Prof. Suess is reported to have sketched in the Vienna papers, seems to cut through the Archæan crystalline mass in the north of Calabria, and then to follow its western boundary for some distance further south, coinciding in part with the shore-line. Under the strait itself it seems to bifurcate "in the direction of Etna," according to Suess, but I would suggest along the southern limit of the exposed crystalline mass, which forms the high promontory of the Peloritan mountains, since Taormina appears to have escaped the effects of the earthquake. The point of bifurcation would be the weakest place, and therefore the locality in which the upthrust would be most perceptible. If this is admitted, we may discern here the true cause of the dual wave which swamped the low-lying portions of both Messina and Reggio.

Further, the steepness of the submarine gradients on the south or Ionian side of the area, as compared with those on the Tyrrhenian side, seems to indicate the existence, on a much smaller scale, of conditions which hold good in Japan, where the bed of the ocean rapidly descends to the greatest oceanic depth known on the Pacific side, the "concave" side of the "mountain-wave" (Suess), as compared with the gradients of the "convex side," the shallow Sea of Japan. Prof. Suess (one of our greatest masters) will therefore perhaps allow me to suggest that the seismic movement in the present instance occurred rather on or just outside the rim of the disc-like area of subsidence which is occupied by the Tyrrhenian Sea, an area of which the Lipari Islands with their volcanoes mark an incidental fracture-feature (as worked out years ago by Judd) rather than the centre.

In the view here put forward the minor earthquake shocks felt a fortnight or so later in the Tuscan region, at Ravenna, and other places, would follow as incidents in the more complete adjustment of the geologically young range of the Apennines to the disturbances of previous mechanical equilibrium, caused by the greater disturbance on the other side of the Tyrrhenian Sea, which has startled the world by its results. The differential results in the Messina-Reggio region would seem, further, to be accounted for by sidelong movements of the ground due to overthrust faulting, so terrible always in its effect upon buildings badly constructed and erected upon such loose and incoherent rock-materials as those which constitute the Quaternary and later Tertiary strata, upon which the low-

lying portions of the ill-fated cities and the Calabrian villages once stood. It is a warning to those who may be in any way responsible for rebuilding them.

A. IRVING.

Bishop's Stortford, January 21.

The Isothermal Layer of the Atmosphere.

MR. DINES makes a happy choice of terms when he writes of the isothermal *column* (NATURE, January 21, p. 341). Each of the unrejected traces is interpreted to show a more or less isothermal column, and it is by mentally piecing together these columns into a sort of honeycomb that the miscalled isothermal *layer* is brought into existence. It must not be forgotten that this hypothetical layer has a very uneven floor, and that each cell in the honeycomb has its own particular temperature. This is a complex structure. I certainly think it more feasible to ascribe the sudden and sustained minimum in the temperature curve, which is the gist of this discussion, to some idiosyncrasy or limit to which all the instruments, foreign as well as native, are subject night and day, and on the down as well as the up journey. In your issue of January 21 I referred to the falling density of the air current, upon which current the whole experiment depends. If the trace shows a uniform temperature during the upper 9 kilometres of an ascent, there is no escape from the conclusion that the temperature of the air has steadily fallen to compensate for its tenuity, and if we assume an adequate compression of the hydrogen before the rubber gives way, there is a further compensation required for loss of speed.

I shall now endeavour to answer Mr. Dines's points by the help of the old-fashioned laws of heat.

"The isothermal column of air shows just as plainly in ascents made after sunset as in those made in the day."

Yes. Radiation is stronger by day, but radiation and convection balance at some point, and the balance, if maintained, means a regular fall of temperature upwards.

"At night the thermograph must receive some heat by radiation from the earth, and lose some by radiation into space, but both amounts must be infinitesimal in comparison with that which would be given to it by the sun."

Being quite close to the hot planet, and being far below the temperature due to such proximity, the balloon, &c., will receive more radiation than they emit. The radiation from the planet, subtending nearly a hemisphere, will be far from infinitesimal compared with that of the sun.

"That solar radiation in the ordinary conditions is not important is proved by the fact that if the balloon bursts, and therefore does not float, it is not possible to say from the trace alone if the ascent was by night or by day."

If solar radiation cannot be detected on the traces it must be because they differ so much *inter se*. Surely if aëration is so good for the thermograph it must be equally good for the balloon, and a perfect torrent of warmed air must waft on to the instrument during the ascent.

"There have been cases in which the balloon did not burst, and the temperature at the top reached the freezing point of water."

This shows an approach to what I call the natural temperature of a body between the sun and a warm planet. Of course, the balloon, instrument, &c., would have been much hotter out of contact with the cold air which was basking in the sunshine at a temperature of about 100° F. *below* freezing. This recalls the question with which I finished my last letter.

"I still believe that radiation at night to and from the bright metal of the thermograph is so trifling that the rate of ascent is of no consequence."

The whole apparatus is admirably contrived—let us try faithfully to decipher the trace it gives us. The thermograph is scores of degrees below its natural temperature. This argues an intake of heat by absorption of rays, which heat is taken by the air current. The current must be colder or more rapid at the 20-kilometre level to give the traces that are now under discussion.

"There is also the fact that the up-trace, where the motion is comparatively slow, is identical with the down-trace where the motion is rapid."

Mr. Dines has dispensed with a timepiece in many cases. Can he speak positively as to the vertical speeds? If it is quite clear that the down-speed is greater I can only suggest that with a parachute the motion is partly lateral, *i.e.* a gliding motion *through the air*, which would tend to interfere with the draught, as would also the parachute acting as a cover to the screen. Perhaps also the parachute subtends a larger angle than the balloon did.

Summarising the matter, I contend that "isothermal layer" is a misleading misnomer.

The basaltic structure of the upper air which is inferred from the traces is intrinsically improbable.

To get the temperature of the air from the trace a curve must be drawn on its low-temperature side and diverging upwards.

The result will be a non-isothermal curve.

The amount of this correction for all currents can be determined on the instrument in the laboratory.

R. F. HUGHES.

The Size of the Leather Turtle.

As trustworthy weights and measurements of large turtles are not often available, the following measurements and weight of a leather-back turtle, Sphargis, are submitted in the hope of eliciting further data regarding this or other species. The total length of the animal, measured along the curve from the nose to tail, was 6 feet 10 inches; the carapace along the curve, 5 feet 2 inches; the circumference at the widest part of the carapace, 7 feet 2 inches; from tip to tip of front flippers, over the shoulders, 8 feet 9 inches. Weight, a little more than 840 lb., for, when on the scales, the tips of the large front flippers rested on the ground. This is one of the largest turtles of this species that has come under my observation. Another specimen that I was able to weigh turned the scales at 740 lb.

F. A. LUCAS.

Museum of the Brooklyn Institute, Eastern Parkway, Brooklyn, N.Y.

Moral Superiority among Birds.

IN NATURE of January 7 Mr. F. C. Constable describes an observation of the moral superiority of the blue-tit over the robin. This is by no means exceptional. I constantly observe the same thing from my dining-room window, where I have a string stretched across with pieces of cocoa-nut and pork-fat attached to it for the tits to feed upon. In the cold weather the robins come too, but they are never allowed to feed in company with the blue-tits; they are attacked at once if they venture to hold their ground. The long-tailed tits and the cole-tits are much less aggressive, and will even give way to the robins.

LAURA D. H. DUKES.

23 Torrs Park, Ilfracombe, February 1.

WOMEN AND THE FELLOWSHIP OF THE CHEMICAL SOCIETY.

IN our issue of July 9, 1908 (vol. lxxviii., p. 226), we directed attention to the fact that an influentially signed memorial had been presented to the council of the Chemical Society stating that, in the opinion of the memorialists, 312 in number, including ten past presidents, twelve vice-presidents, and twenty-nine members of council, among whom were thirty-three Fellows of the Royal Society, and the heads of the chemical departments of nearly all the most important universities and colleges in the kingdom, the time had come when duly qualified women should be admitted to the fellowship of the society, and praying that the council would take the necessary steps to permit of their election.

The council, having taken the memorial into consideration, determined to consult the whole body of the society, and instructed a committee to prepare a statement of reasons for and against the proposal, to be submitted, together with the memorial itself, to